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Decentralization and Local Public Services in Ghana: Do Geography and Ethnic Diversity Matter?

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ABSTRACT

This paper explores disparities in local public service provision between decentralized districts in Ghana using district- and household-level data. The empirical results show that districts' geographic locations play a major role in shaping disparities in access to local public services in Ghana. Most importantly, the findings suggest that ethnic diversity has significant negative impact in determining access to local public services, including drinking water. This negative impact is significantly higher in rural areas. However, the negative impact of ethnic diversity in access to local public services (drinking water) decreases as average literacy level increases. The paper relates the results to literature and discusses policy implications of main findings.

Keywords: decentralization, access to public services, ethnic diversity, geography, Ghana

1. INTRODUCTION

The decentralization of authority and responsibility for public services provision to local governments is an essential part of the overall governance reform and development strategy in many developing countries around the world. The argument is that decentralization will increase economic efficiency and allow greater differentiation in the provision of public services due to improved preference matching and government accountability (Bardhan and Mookherjee 2006; Lockwood 2006). This reflects the beliefs that because local governments are closer to the people than the central government, (1) they will be better informed about the preferences and circumstances of the residents; therefore, decentralization can improve allocative efficiency in the sense that the services provided by local governments will be better matched to the preferences of their populace; and (2) local people might be better informed about the actions of local government; therefore, they will be in a better position to hold their government more accountable.

However, some authors argue that the benefits of decentralization are not as obvious as proponents of decentralization suggest, and there could be serious shortcomings that policymakers should be aware of in designing decentralization policies (Prud'homme 1995; Breton 2002; Crook 2003; Collier 2007). One of the potential risks with decentralization is that it can lead to greater interjurisdictional disparities due to the differences in socioeconomic potential and expenditure needs of subnational governments. The argument is that subnational governments with better factor endowments and potential will have a larger revenue base than other, poorer subnational governments and therefore will be able to provide more local public services. This may cause disparities in economic opportunities and create gaps in income and public service delivery between various jurisdictions. Prud'homme (1995) considers decentralization as the pure decentralization as viewed in earlier fiscal federalism literature; that is, local governments fund local public services with their own local revenues without transfers from the central government. However, evidence suggests that intergovernmental transfers, such as equalization grants, can play an important role in overcoming imbalances between revenue capacities and expenditure needs of local governments (Martinez-Vazquez and Searle 2007).

Another risk with decentralization may include inadequate local capacity and the politics of local-central relations. Government accountability and allocative efficiency may not be achieved with decentralization when the scarcity of public sector administrative, financial, and managerial capacity is more problematic at the lower levels of government (Collier 2008; Crook 2003). However, the evidence suggests that lack of resources is not necessarily the problem. Using examples from Uganda and South Africa, Dauda (2006) shows that developing political capacity for demanding accountability for existing resources is more important.

Whether advantages or disadvantages of decentralization will prevail is an empirical question. There are several studies that examine the relationship between decentralization and regional disparity both in developed and developing countries (e.g., Ahmad, Brosio, and Tanzi 2008; Bardhan and Mookherjee 2005; Gajwani, Kanbur, and Zhang 2006; Kanbur and Zhang 2005; Kim, Hong, and Ha 2003). These studies mostly focus on developed or developing countries of Asia and Latin America, and evidence appears to be inconclusive. This problem in the context of sub-Saharan African countries is studied very rarely despite the fact that for many countries in the region such as Ghana, it is a very practical issue as they are pursuing serious decentralization programs. Vanderpuye-Orgle (2002) finds that regional disparities between the northern and the southern regions of Ghana have taken an upward trend since 1992. This time period coincides with the inception of an important decentralization policy. However, Vanderpuye-Orgle does not provide any analysis of the disparities between districts.
The aim of this study is to contribute new empirical insights to this question, derived from district- and household-level quantitative analysis. For a district-level analysis, we create unique cross-sectional data for 110 districts of Ghana. Our household-level analysis is based on the Core Welfare Indicators Questionnaire survey conducted in 2003. We focus on the following specific research questions: What is the extent of interdistrict disparities in Ghana? What are the determinants of observed disparities between

decentralized districts? What is the impact of spatial disparities on access to local public services at the household level?

The remainder of the paper is structured as follows. Section 2 provides a brief overview of Ghana's decentralization policy. Section 3 reviews the literature and then develops a simple theoretical framework to examine the potential sources of disparities between decentralized districts. Section 4 describes data sources and discusses empirical methodology. Section 5 reports the empirical results of the district-level and household-level analyses. Section 6 provides conclusions and implications of the results.

2. OVERVIEW OF DECENTRALIZATION IN GHANA

Ghana's current legal and organizational framework for the decentralization program is provided by the 1993 Local Government Act (Act 462), which replaced the Local Government Law of 1988 (Law 207). The initiative for the program was motivated by a political philosophy of "power to the people" and the broader reform agenda whose principles concern the role and responsibilities of the various levels of government and private sector for economic development (Ayee 2003a, 2003b). The decentralization process in Ghana started with the establishment of 85 districts in 10 regions of the country in 1988. By 1992, the number of districts had increased to 110.[1]

The 1992 Constitution, which marked Ghana's transition to a multiparty democracy, endorsed the 1988 reforms by consolidating the principles of decentralization within the overall context of a liberal democratic constitution. This constitution laid out the principles of the autonomous role of local government and its downward accountability to the populace. A three-tier structure of subnational government was created at the regional, district, and subdistrict levels. This includes 10 regional coordinating councils; district assemblies (DAs); urban, zonal, town, and area councils; and unit committees. However, the DA is the key local government institution. Article 241 of the constitution states that they are "the highest political authority in the district … with deliberative, legislative and executive power." DAs include both elected and appointed members. Seventy percent of DA members are elected in local government elections that are held every four years. The central government appoints the other 30 percent of DA members and the district chief executive (DCE), who is an ex-officio member of the respective DA. The members of the national parliament from a district are also entitled to participate in the DA with nonvoting capacity.

In general, the DAs hold three to four general meetings each year, during which they act as the district legislature. The main administrative and executive functions of the DAs are undertaken by the respective executive committees, which are responsible for general policy and overall development planning in a given district. They are the principal authority in their respective districts for development activities, including coordinating and integrating other development partners. The districts are responsible for delivery of various public goods and services, including such significant areas as feeder roads, agricultural extension, primary and secondary education, health, water, and sanitation. Part of these public service delivery functions are devolved to district governments, while others are simply deconcentrated to them.

Devolved public services entail full responsibility residing in the hands of district governments, including legislative (adopting bylaws), fiscal (revenue raising and expenditure allocation), and administrative discretionary power. Examples of such devolved services in Ghana include construction and maintenance of feeder roads, delivery of relief and sanitation services, and development planning. Delegated public services include those that are delegated to districts by the central government ministry or agency. In this case, the DAs act as agents of central government without significant discretionary power in these services. Examples of delegated services in Ghana are the provision of public health services in consultation with the Ministry of Health; the delivery of primary and secondary education under guidance of the Ministry of Education; and water supply in conjunction with the Ghana Water and Sewerage Corporation in urban areas and with the Community Water and Sanitation Agency in rural areas.

With respect to fiscal decentralization, districts are entitled to generate their own internal revenues. However, the potential to generate their own internal revenue varies significantly across districts: Some districts cover up to 70 percent of their total public expenditures by internally generated revenues, yet some other, poor districts cover only about 5 percent of their total public expenditures by internally collected funds. The latter districts rely mostly on transfers from the national government.

[1] As a result of further changes in administrative structure of the country, the number of districts increased to 138 in 2004, and to 162 in 2007. However, this study is based on 110 districts due to lack of data for newly created districts.

Article 252 of the 1992 Constitution of Ghana mandated the transfer of at least 5 percent of total national fiscal revenues to district governments through the District Assembly Common Fund (DACF), which was implemented in 1994. Starting in 2008, the size of these transfers increased to 7.5 percent of the total national revenues. On average, in 2004, transfers from the central government accounted for over 80 percent of total local revenues. The DACF grants are allocated between districts based on a special formula, which is approved by the national parliament every year. This formula considers various social and economic factors, such as *need*, *responsiveness*, *service pressure*, and *equality*, in allocation of DACF funds between districts (for a detailed discussion of the DACF and the allocation formula, see Banful 2008).

Earlier studies have shown that the development pattern in Ghana is characterized by a north-south divide in which the south outperforms the north (ODI and CEPA 2005; Shepherd and Gyimah-Boadi 2004). These studies claimed that underdevelopment of the north compared with the south is due to history, unfavorable climate and agro-ecological conditions, and postindependence political neglect. One previous study in particular found that overall inequality in Ghana has taken an upward trend since 1992 and become increasingly polarized (Vanderpuye-Orgle 2002). This study argued that much of the variation in total inequality can be attributed to changes in spatial disparities between administrative regions, agro-ecological zones, and the rural-urban divide. However, there are serious gaps in the existing research. As we mentioned earlier, the main administrative unit for decentralization in Ghana is a district. Therefore, any meaningful decentralization policy needs information about levels and trends in interdistrict disparities in economic opportunities and local public service provision.

3. THEORY

In this section, we briefly review the literature and develop a simple theoretical framework that helps to organize our thoughts and focus on potential sources of cross-district differences in local public service provision. The model will also help us in developing specifications for the empirical analysis.

3.1. The Literature

The case for decentralization is fundamentally based on accountability and efficiency considerations. Decentralization may help to improve accountability in two ways: via yardstick competition and by strengthening the link between policy choices and reelection chances of local politicians (Hindricks and Lockwood 2006). With respect to efficiency considerations, Oates (1972) suggested that centralization should be naturally superior to decentralization so long as returns are increasing to scale. Thus, any case for decentralization on efficiency grounds should evoke counterbalancing sources of efficiency in which decentralized governments have an advantage.

As Lockwood (2006) summarizes, there are two broad approaches to the problem: the "standard" model and the political economy approach. The standard model assumes that both central and local governments are benevolent, that is, they maximize total welfare in their respective jurisdictions. This approach developed the so-called decentralization theorem, which results in the following general statements: (1) If jurisdictions are identical and there are no spillovers between them, then centralized and decentralized provisions of public services are equally efficient; (2) if jurisdictions are not identical and there are no spillovers between them, then decentralized provision is more efficient; (3) if jurisdictions are identical and there are spillovers between them, then centralized provision is more efficient (Oats 1972; Lockwood 2006). However, these results rest largely on two key assumptions: benevolence at each level of government, and policy uniformity, that is, "uniformity in public programs across all communities."[2] These assumptions are problematic, especially for developing countries. Another disadvantage of the standard approach is that it does not consider the accountability argument at all.

The political economy approach, which systematically models the behavior of government, taking into account political and institutional context, relaxes both of these assumptions simultaneously by assuming that under centralization, local public good provision may be heterogeneous, and moreover, levels of public good provision are determined by bargaining between district delegates to a national legislature. Thus, in the standard approach, political processes and institutions, not benevolent social planners, determine the choice of public policies in practice. There are various threads within the political economy approach to decentralization, such as legislative, strategic delegation and electoral accountability models (Lockwood 2006). Our aim here is not to extensively review all those models but rather to highlight that the political economy approach can give a rigorous account of the efficiency (preference matching) and accountability benefits of decentralization.

For example, Besley and Coate (2003) provide a political economy (legislative) model to examine centralized versus decentralized provision of local public goods. In this model, they assume that elected representatives in national legislature bargain over public goods provision in multiple districts. Similar to the standard model, if districts are not identical, they find that decentralized provision of local public services continues to be welfare superior in the absence of spillovers. However, contrary to the standard approach, they find that centralization is no longer superior when spillovers are present. Moreover, they find that higher heterogeneity reduces the relative efficiency of centralization for any level of spillovers because heterogeneity creates conflicts of interest between citizens of different districts. Thus, in the presence of heterogeneity between districts, strategic choice of delegates by voters may cause centralization to be less efficient by reducing "preference matching." Faguet (2004) uses a similar framework to examine whether decentralization increases the responsiveness of public investment

[2] Oates, W., 1972. *Fiscal Federalism*. Harcourt-Brace, New York.

to local needs in Bolivia. Ahmad and Brosio (2005) also use an analogous framework to evaluate outcomes of decentralization in Ghana and find mixed results.

There is a considerable amount of literature on democratic decentralization, participation, and service delivery. Although decentralization has potential to increase accountability and to improve service delivery at the local level, the evidence suggests that (1) quality and equity of access to services have not improved with decentralization, and (2) outcome of decentralization is closely related to the availability of financial resources and local government capacity (Robinson 2007). Crook (2003) finds that in most sub-Saharan African countries, elite capture of local governments has been facilitated by the desire of ruling elites to create and sustain a power base in the countryside. He concludes that even when the interests of the poor have achieved some representation through democratic decentralization, accountability mechanisms have not been strong enough to ensure that these interests are represented effectively in policymaking. However, using examples from Uganda and South Africa, Dauda (2006) shows that developing political capacity for demanding accountability for existing resources is imperative. The evidence demonstrates that participation in civil society institutions and diversity within government structures are vital in developing ways of demanding accountability and transparency of local government.

Another group of studies analyzes the relationship between decentralization (and fiscal federalism), regional disparities, and economic development. Theoretically, the relationship between decentralization and spatial disparity is ambiguous. McKinnon (1997) and Qian and Weingast (1997) focus on the incentive effects of decentralization on subnational governments and suggest that regional disparities may be related to the efficiency of public services. Fiscal centralization and redistribution of resources from central government to *ex post* poor districts may soften their budget constraints and distort their *ex ante* incentives to escape from getting poor. In this regard, decentralization might help to reduce regional disparities.

However, decentralization might lead to horizontal fiscal imbalances between decentralized districts because of the different fiscal capacities and expenditure needs of these districts. It might also lead to vertical imbalances in favor of the central government because of the same reason. In many countries an intergovernmental transfer system exists to overcome these imbalances (Martinez-Vazquez and Searle 2007).[3] Some authors question the effectiveness of such equalization transfers. On the one hand, equalization transfers could give disadvantaged districts the scope they need for investments in public infrastructure and services. On the other hand, it is not clear whether they use these transfers effectively (Feld and Dede 2005). It is also possible that instead of investing in public services, these transfers are used for consumption and rent-seeking activities.

There are a number of empirical studies on the impact of decentralization on spatial disparity (Kim at al. 2003; Bonet 2006; Kanbur and Zhang 2005; Zhang and Zou 1998). For example, Kanbur and Zhang (2005) show that decentralization led to higher regional inequalities in Chinese provinces in the period from 1952 to 1999. Similarly, Zhang and Zou (1998) find that a higher degree of fiscal decentralization in Chinese government spending is associated with lower provincial economic growth from 1978 to 1992. Contrary to these findings, Bonet (2006) finds a negative impact of fiscal decentralization on regional income distribution in Colombia. Ahmad et al. (2008), reviewing theoretical and empirical literature, suggest that links between decentralization and convergence and the like are tenuous.

3.2. The Model

Our empirical analysis is based on a simple analytical framework for decentralized provision of local public services, which is developed using insights from Besley and Coate (2003), Faguet (2004), and

[3] Examples of developing and transition countries that use intergovernmental equalization transfers are Nigeria, Ghana, Kyrgyzstan, Pakistan, and India among others. Many developed nations, such as Canada, Germany, Japan, Australia, and the United Kingdom also use fiscal equalization schemes.

Ahmad and Brosio (2005). However, differently from these studies, our focus is not centralized versus decentralized provision of public goods, but the differences in local public service provision between decentralized districts. A country is made up of *K* decentralized districts, with a population size of N_k each where subscript *k* identifies district. We assume that districts are not identical and they provide certain local public services to their constituents. Preferences of all individuals have the same linear form,

$$u_i = x_i + \mu_i b(g_k), \quad (1)$$

where x_i is a private good consumed by an individual *i*, and g_k is the amount of local public service available in district k. The preference of individual *i* for local public service g_k *is* denoted by μ_i.

In most developing countries, local public goods are financed by both a proportional local tax on income and transfers from a central government and donors. However, for the sake of simplicity, we assume that districts rely only on a local tax (a head tax), t_k, to finance local public services. Therefore, utility of an individual *i* in district k is

$$u_{ik} = y_{ik}(1 - t_k) + \mu_{ik} b(g_k), \quad (2)$$

where $x_{ik} = y_{ik}(1 - t_i)$ and y_{ik}indicates the income of individual *i* in district k. We can define local welfare as a median utility,

$$u_{mk} = y_{mk}(1 - t_k) + \mu_{mk} b(g_k), \quad (3)$$

where *m* is used to denote the median individual in district k, and y_{mk} and μ_{mk} are the local median income and preference for local public service in district k, respectively.

The budget constraint for district k can be defined as

$$t_k N_k = \frac{g_k}{\gamma_k}\ , \quad (4)$$

where $\gamma_k$indicates the potential cost disability[4] of a given district k. This cost disability factor should not be confused with economies of scale, that is, cost advantage due to size, which is represented by the district population (N_k). This cost disability factor captures the differences in the cost of local service delivery across districts relative to the average of all districts. A district may have a cost disadvantage for provision of local public service for a variety of reasons. For example, it may have a geographically dispersed population and have to provide services in remote locations. This means that, ceteris paribus, a unit cost of a particular service in this district may have a higher cost than the average cost across all districts. Other factors contributing to differences in cost of service provision might include the composition (rural versus urban, sex, age, etc.) of the population. Furthermore, the differences in the cost of service provision could be related to differences between districts in government accountability, bureaucratic slack, managerial capabilities, and technical knowledge of local governments.
By solving equation (4) for tax rate, we get the required tax rate to provide $g_k$level of local public service in district k:

$$t_k = \frac{\gamma_k g_k}{N_k} \quad (5)$$

By substituting the tax rate from equation (5) into equation (3), we rewrite the utility of median individual in district k as

$$u_k = y_k - \frac{y_k \gamma_k g_k}{N_k} + \mu_k b(g_k), \quad (6)$$

where we drop all subscripts m for simplicity. Thus, the local government's welfare maximization problem in district k is

$$\max_{g_k}[\, y_k - \frac{y_k \gamma_k g_k}{N_k} + \mu_k b(g_k)]. \quad (7)$$

[4] Assuming there are only two districts, this cost disability factor can be defined as $\gamma_k = 2c_k/c_1 + c_2\,, k = 1,2$, and c_k is the cost local service provision in district k. So defined, if $\gamma_k > 1$, then district k is a relatively high-cost provider of the local public service (has a cost disability), and if $\gamma_k < 1$, it is a relatively low-cost provider.

Taking first-order conditions and rearranging yields, we get the optimum choice of local public service as

$$b'(g_k) = \frac{y_k \gamma_k}{\mu_k N_k} \tag{8}$$

Thus, the equilibrium level of local public services provided by district k is an implicit function of the income (y_k) and the cost disability factor (γ_k), the median preference (μ_k) for the local public good, and the size (N_k) of the district. This also implies that local governments are more likely to provide different levels of public services to their constituents, as these factors tend to vary across districts. From equation (8), it is easy to see that, ceteris paribus, local public goods provision will be higher in districts with better cost efficiency and homogenous preferences.

So far we have focused on potential sources of disparities between districts in local public service provision. The important question is, How do these factors impact access to local public services at the household level? Similarly to Ahmad and Brosio (2005), extending the insights of the analysis above to the individual level, we can determine the consumer surplus for a given individual i from a given district k as follows:

$$CS_i(g_k) = \mu_{ik} b(g_k) - \frac{\gamma_k g_k}{N_k}. \tag{9}$$

Equation (9) suggests that, other things being equal, the well-being of individuals will be higher in districts where the local government can determine the preferences for local public goods more precisely, the cost-efficiency of district government, and the district size.

3.3. Discussion

Some important aspects of local public service provision are not explicitly addressed in this simple model. We now consider two important implications of the model. This will help us to derive the specifications of the empirical model and to bring the theory with the data. First, the model suggests that economies of scale may exist in the provision of local public services, because average costs decline as the number of recipients of the services increases. Equation (4) implies that there is a negative correlation between population size *N* and local tax rate *t*. In other words, for given g and γ, as district size *N* increases, the per-head tax level *t* decreases. Thus, more populous districts are more likely to have an advantage in local service provision. However, the relationship between the level of local public services and population size might be endogenous, that is, better local services may attract migration and thus increase population size. For this reason, it is best to think of population size as a proximate determinant of local public service provision. We consider geography as a deeper factor, which affects both local services and population density. Geography relates to the advantages and disadvantages created by districts' physical locations and agro-ecological conditions. In fact, the descriptive analysis in Section 4.2 shows considerable correlation between districts' geographic location and population density (correlation coefficient = 0.53). However, this does not mean that geography can fully replace population density in the empirical analysis. We may still need to include population density in the empirical model.

Geography might also directly influence the demand for and supply of local public services. Different types of countryside might have an advantage for different types of local public goods. For example, supply of drinking water is highly dependent on the availability of surface and ground water sources in a given geographic area. Climate and environment play important roles in shaping the public health environment (the inhabitants' proclivity to debilitating infectious diseases such as malaria) and the need for public health care. The evidence also suggests that areas closer to large metropolitan areas tend to have higher population density due to agglomeration effects (World Bank 2008). Further, geography may influence local public services through other factors such as institutions. As Eichengreen (1998), Engerman, Haber, and Sokoloff (2000), and Sokoloff and Engerman (2000) have shown, the initial factor endowments for the large part explain income, human capital, and political power inequalities; these

inequalities in turn explain the structure and functioning of institutions that insure the persistence of inequalities.

Second, our theoretical model suggests that the equilibrium level of local public services will be lower, ceteris paribus, if the preferences for local public services are more diverse. We have not related the preferences for local public services to any observable variables yet. In recent years, there has been increasing interest in the impact of ethnic diversity on the preferences for public services. The literature suggests that preferences for public services and ethnic origins are strongly correlated. It is evident that different ethnic groups tend to have different tastes and preferences for local public services, and thus, heterogeneity of preferences across ethnic groups in a jurisdiction is likely to influence the amount and type of public goods the jurisdiction provides (Alesina, Baqir, and Easterly 1999; Vigdor 2004). Obviously, ethnic diversity is not the only factor that influences preferences for local public goods. Certainly, income and education are other ones. Thus, distribution of income and variations in education level, in addition to ethnic diversity, could be important determinants of the distribution of preferences for public goods. Therefore, in the empirical work we control for income distribution and education.

Further, literature also suggests that participation in social activities tends to be significantly lower in more fragmented localities, leading to lower social capital and weak local institutions. As a result, the incapability of weak local institutions to impose social sanctions in diverse communities leads to collective action failures. Diverse communities thus face higher coordination costs in provision of local public services (Miguel and Gugerty 2005). Hence, ethnic fragmentation may also influence local public services through its impact on the cost efficiency factor.

Finally, geography may also influence ethnic diversity in the long run via migration. In the simplest form migrants from unfavorable regions may be drawn to regions with favorable conditions, and this in-migration may increase ethnic diversity in receiving regions. Given the insights of the model and follow-up discussion, the important empirical question is, What impact do geography and ethnic diversity have on local public services? The next section describes data and explains how we plan to empirically examine this question.

4. EMPIRICAL METHODOLOGY AND DATA

4.1. Empirical Model Specifications

Our theoretical model suggests that the level of public services provided by a decentralized district depends on the income, the cost efficiency, median preferences over local public services, and population size in the district. The follow-up discussion links these factors with geography and ethnic fragmentation, the two potentially exogenous determinants of cross-district disparity in local public service delivery. Thus, the main question for our empirical analysis is whether geography and ethnic diversity have any effect on local public services after controlling for observable variables at the district and household levels. While exogeneity of geography is quite obvious, we have ruled out that local unobservable characteristics correlated with ethnic fragmentation—rather than ethnic fragmentation itself—are in fact driving the estimated effects. Our identification strategy with respect to ethnic fragmentation is similar to Miguel and Gugerty (2004) and relies on the stable, historically determined patterns of ethnic land settlements in Ghana and their persistence over time. Ghana is a highly multiethnic and multicultural country with about 100 ethnic groups characterized by linguistic and cultural differences. Nevertheless, Ghana's population now can be classified into five groups[5]: the Guan, the Mole-Dagbani, the Akan, the Ewe, and the Ga-Adangbe. These groups settled in the country over the last 1,000 years, and their land settlements largely have been stable over time (Salm and Falola 2002). Thus, it is plausible to assume that ethnic land settlement patterns in Ghana are exogenous.

We have divided the analysis into three stages. The first stage analyzes the evidence of cross-district differences in access to local public services and to what extent these differences had been shaped by local geographic endowments and ethnic diversity. This analysis is based on standard ordinary least squares (OLS) methodology. To test the robustness of the OLS results to spatial dependence, we also estimate our models by using spatial econometric techniques.

At the district level, to examine the impact of geography and ethnic diversity in access to local public services, we estimate the model

$$Y_k = \alpha + \beta_g G_k + \beta_e EFI_k + \varphi D_k + \varepsilon_k , \qquad (10)$$

where G_k is a matrix of geographic location variables including distance to district from the nation's capital (Accra) and distance to district from a respective regional capital and agro-ecological zone; EFI_k is a vector of district-level ethnic fractionalization; and D_k is a matrix of district characteristics including population density, share of rural population, average literacy level, per capita public expenditures, and internal revenue generation. We use a composite index[6] of access to local public services as a dependent variable (Y_k). We include each group of independent variables incrementally, and lastly we estimate the full model.

Additionally, we use spatial econometric techniques to explore the importance of the effects of neighboring districts for robustness of the results. The motivation for this is that unobserved effects may spillover across districts and hence result in spatially correlated errors. As a result, standard OLS estimates are no longer efficient, but they are still unbiased. The most common choice to model such spatial dependence is a spatial autoregressive process such as

$$Y_k = \alpha + \beta_g G_k + \beta_e EFI_k + \varphi D_k + \varepsilon_k$$
$$\varepsilon_k = \lambda W \varepsilon_k + \epsilon, \qquad (11)$$

with γ as the autoregressive parameter, $W\varepsilon$ as a spatially correlated error, and ϵ as a well-behaved random error term (Anselin 2006).

In the second stage, to formally answer whether geography and ethnic diversity have impact in determining household-level access to local public services, we estimate series of multilevel random-intercept logistic models for access to drinking water. For this analysis our dependent variable is binary or

[5] Some mention six broad groups or classifications for Ghanaians: the five noted here plus the Gurma; others note only four, omitting the Guan.

[6] The details of this composite measure of access to local public services are given in next section.

dichotomous, which measures whether a household has access to drinking water. The responses are coded as 1 or 0, where 1 is interpreted as the household's having access to drinking water and 0 as not having access. We use two types of information as indicators of access to drinking water: (1) access to any source of drinking water (from now on, *drinking water*) and (2) access to an improved source of drinking water (from now on, *improved drinking water*). A natural model to consider for estimating the effects of district and household characteristics on access to drinking water is a standard logistic regression model. Standard logistic regression modeling usually assumes that the error terms have zero mean and are mutually independent. However, in nested cross-sectional data, we would expect that measurements within the same districts are correlated. In this case, standard logistic regression estimates are still consistent, but the estimated standard errors of the regression coefficients are no longer valid.

One way of addressing this problem is to use multilevel modeling, which explicitly models the dependence by decomposing the total residual or error term into error components: a permanent error component, which varies between districts; and a transitory error component, which varies between households as well as districts. The permanent error component represents the combined effects of omitted district characteristics or unobserved heterogeneity. Since it is shared by all households for the same district, it induces within-district dependence. Another advantage of using multilevel modeling is that multilevel models allow us to test whether within-level or cross-level interactions are significant in determining the dependent variable.

We specify a two-level random-intercept logit model for access to drinking water with household i nested in district k:

$$Y_{ik} = \alpha + \beta_h HH_{ik} + \beta_g G_k + \beta_e EFI_k + \varphi D_k + \xi_k + \varepsilon_{ik} , \quad (12)$$

where HH_{ik} is a vector containing all household-level covariates, D_k is a vector containing all district-level covariates, ξ_k is a random intercept varying over districts (level 2), and ε_{ik} is a well-behaved error term that has a logistic distribution with variance $\gamma^2/3$. Y_{ik} is a binary variable for a household that has access to drinking water. This two-level random-intercept model can be viewed as a regression model with a district-specific intercept $\alpha + \xi_k$. Here $\xi_k$can be considered as a random parameter that is not estimated along with parameters $\alpha, \beta_h, \beta_g, \beta_e, and\ \varphi$, but whose variance is estimated together with the variance of the ε_{ik}.

Similar to equation (12), we specify a three-level random-intercept logit model for access to a drinking water with household i nested in district k which is nested in region j:

$$Y_{ikj} = \alpha + \beta_{hh} HH_{ikj} + \beta_g G_{kj} + \beta_e EFI_{kj} + \varphi D_{kj} + \xi_{kj} + \xi_j + \varepsilon_{ikj} , \quad (13)$$

where HH_{ikj} is a vector containing all household-level covariates, D_{kj} is a vector containing all district-level covariates, ξ_{kj} is a random intercept varying over districts (level 2), ξ_j is a random intercept varying across regions, and ε_{ikj} is a well-behaved error term that has a logistic distribution with variance $\gamma^2/3$. Y_{ikj} is a binary variable for a household that has access to drinking water. Obviously, the random intercepts (ξ_{kj} and ξ_j) are assumed to be independent.

In stages 1 and 2 (equations 10 to 13), the main coefficients of interest are β_h and β_g. Following the argument in Section 3.2, we expect that unfavorable geography impacts local public service provision negatively. Similarly, we expect that ethnic diversity negatively impacts the provision of local public services. The variables in D and HH are not included in equations (10) to (13) as mere controls, however. The coefficients of variables in D are of interest insofar as they help to explain district-level institutional and socioeconomic determinants of local public service provision, and so constitute indirect tests of the predictions of our theoretical model. The coefficients of variables in HH are of interest to the extent that they play a role in reducing negative effects of an adverse geography and ethnic diversity. For example, we expect that education and income positively impact households' access to local public services.

In the third stage, to explore the potential interaction effects of ethnic diversity with district- and household-level variables, we extend equation (13) with interaction terms. First, we examine the interaction of ethnic diversity with each district's average literacy level, considering the literacy level as a proxy for human capital and managerial capacity in the district. Our hypothesis is that the negative impact

of ethnic fractionalization on local public service provision will be mitigated as literacy level increases. Second, we investigate the specific impact of ethnic fractionalization on local public services in rural areas by interacting it with a rural household variable. We expect that the negative impact of ethnic fractionalization on local public services will be higher for rural households.

4.2. Data and Descriptive Statistics

The empirical analysis is based on the 2003 Ghana Core Welfare Indicators Questionnaire (CWIQ) survey (Ghana Statistical Service 2003). This standardized survey of core welfare indicators comprised a sample of 49,003 households nationwide, with at least 405 households randomly drawn from each of 110 administrative districts of Ghana existing at the time of the survey. The data are representative at the district level. The survey was conducted by the Ghana Statistical Service with methodological and financial support from the World Bank. Additional district- and household-level data were collected from other sources, including the 2000 Ghana Population and Housing Census (Ghana Statistical Service 2005). A more detailed description of the dependent and key independent variables is provided below. Table A.1 in the appendix reports summary statistics of all of the variables utilized in the empirical analyses.

Dependent Variables

We use CWIQ (Ghana Statistical Service 2003) data to measure access to local public services, which provides measures of access to seven public services, including drinking water, public food markets, public transportation, primary school, secondary school, health care, and telecommunication. The survey asked households, How long in minutes does it take from here to reach the nearest service facility? The five possible choices are as follows: 0–14 minutes, score 1; 15–29 minutes, score 2; 30–44 minutes, score 3; 45–59 minutes, score 4; 60 minutes or more, score 5. Thus, the higher the score, the longer the time to reach the nearest service facility.

Descriptive statistic analysis shows that these measures of access to different local services are highly correlated across all households, with correlation coefficients ranging from 0.6 to 0.9. This suggests that randomly selected households are likely to have similar levels of access to different local public services. To facilitate analysis, and in order to obtain an average rate of access to seven local public services covered by CWIQ (Ghana Statistical Service 2003) at the district level that is meaningful and useful, we construct a composite index of access to local public services by using principal components analysis, which captures most of the variance in access to different local public services for each district.[7] This is our dependent variable (*access*) for the district-level analysis.

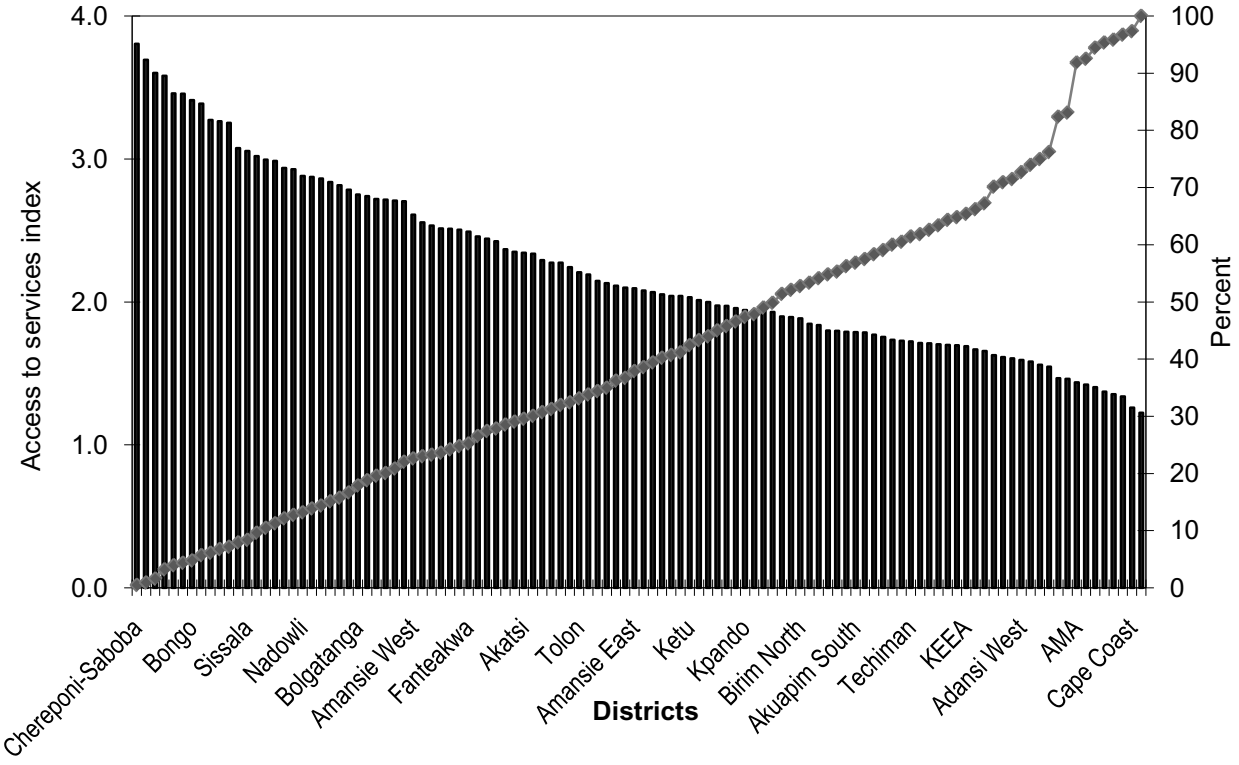
Figure 1 shows the distribution of access to local public services across Ghana's decentralized districts. The index is constructed in a way that lower scores are associated with better access to local services, and vice versa. It varies between 1.2 for Tema Municipal district, where about 2.7 percent of Ghana's total population live, and 3.8 for Chereponi-Saboba district, where only 0.5 percent of Ghana's population reside.

For household-level analysis of access to drinking water, we use two types of dependent variables. Our first dependent variable (*water_ac*) shows whether a household has a reasonable access (water source within 14 minutes) to any supply of drinking water. About 82 percent of all households reported having access to any source of drinking water. By area of residence, urban households have considerably higher (91.4 percent) access than rural households (77.3 percent). The alternative dependent variable (*impr_water*) shows whether a household has access to improved drinking water sources, including piped water in the dwelling, public outdoor tap, borehole, and protected well. Overall, about 72 percent of all Ghanaian households have access to improved water sources. Again, by area of residence, urban households (almost 88 percent) have significantly higher access to improved drinking water than

[7] This process is explained in detail in the Appendix.

rural households (63 percent). However, this gap is much higher compared with access to any source of drinking water. Data also suggest that there are significant variations in access to any and improved drinking water across regions and districts.

Figure 1. Distribution of access to local public services in Ghana: Composite index of access to services



Source: CWIQ (2003), GSS, and authors' calculations

Independent Variables

Our independent variables include geography, ethnic diversity, and district- and household-level socioeconomic indicators. Ghana is located in a tropical zone, but because of variations in relief, soil texture, and such factors as rainfall patterns, it comprises different microclimates. These differences have potentially important impact on the productivity of land and economic development. The evidence shows that the development pattern in Ghana is characterized by a north-south divide in which the north lags far behind the south. The evidence also suggests that these regions are heterogeneous zones. Reasons often put forward include unfavorable geography and economic conditions among others, such as history and postindependence political neglect (Shepherd and Gyimah-Boadi 2004; ODI and CEPA 2005; Morrison 2006).

We use two types of variables to measure the districts' geography: (1) distances from Accra (national capital) and regional capitals, and (2) agro-ecological zones. From GIS sources, we collected latitudes and longitudes for all districts, and then, using the great-circle distance formula,[8] computed the

[8] The great-circle distance is the shortest distance between any two points on the surface of the earth measured along a path on the surface of the sphere (since the earth is a sphere).

distances between Accra and all Ghanaian districts (*adistrict*), and between regional capitals and all districts in the respective region (*rdistrict*).

Data on agro-ecological zoning classify districts in Ghana to forest, coastal, and savanna zones.[9] Main characteristics of these agro-ecological zones are provided in Table A.2 in the Appendix. The forest and coastal zones have a bimodal rainfall pattern with major and minor rainy seasons. In contrast, the rainfall pattern is unimodal in the savanna zone. The average annual rainfall ranges from 800 mm in the coastal zone to 1,600 mm in the forest zone. The forest zone specializes in industrial crops such as cocoa, which is the source of income and livelihood for about 25 percent of Ghana's population. The cocoa industry contributes more than one-fourth of Ghana's total export earnings. The savanna zone mainly specializes in cereals, such as millet, sorghum, and rice. The coastal zone is home to the nation's capital, and it is more urbanized than other parts of the country.

Following the existing literature (Alesina et al. 1999; Miguel and Gugerty 2005; etc.), we use ethnolinguistic fractionalization (*elf*) as the measure of ethnic diversity. This allows us to compare our results with these studies. Ethnolinguistic fractionalization is the probability that two people randomly drawn from the population are from different ethnic groups. It is closely related to a Herfindahl index and formally defined as

$$ELF_k = 1 - \sum_{i=1}^{n} P_i^2, \quad (14)$$

where P_i is a proportion of group i in total population. This index was calculated using the 2000 Ghana Population and Housing Census (Ghana Statistical Service 2005). The index of ethnic fragmentation varies across Ghana's districts between 0.07 and 0.81.

In addition, we include in the empirical models such district-level variables as population size, population density, share of rural population, poverty indicators, literacy level, internal revenue generation, and per capita public expenditures. The data to measure these variables are obtained from the publications of the Ghana Statistical Service. Further, from the 2003 CWIQ data we obtained such household characteristics as income (welfare quintiles); whether the household's community was easily accessible by road all year around; whether the head of household was literate, male, or female; and whether the household lived in rural area.

Correlations

Figure 2 provides the partial associations of the access to local public services index against measures of geography and ethnic diversity. These partial correlations show a strong positive relationship between the geographic variables and the composite index of access to local public services. The index is constructed in a way that lower scores associate with better access to local public services and vice versa; therefore, the farther the district's location from Accra and the respective regional capitals, the lower the access to local public services. Also, districts located in coastal and forest zones are likely to have better access to local public services. On the other hand, the disparities in local public service provision can also be attributed, at least in part, to a significant dispersion in ethnic fractionalization. The more diverse the district's population, the lower the access to local public services.

We found that geographic variables appear to have considerable correlations with other independent variables (Figure 3). First, the districts that are located farther from the regional capitals appear to have relatively higher ethnic fractionalization. Second, the districts' geographic locations are strongly correlated with district characteristics such as average literacy and poverty rate[10]. Third, geography has significant correlations with the districts' population density, access to information, and fiscal capacity. Furthermore, as expected, access to local public services is correlated with the districts' proximate determinants such as population density, poverty, literacy, fiscal capacity, and share of rural population. For example, there is significant correlation (0.62) between access to local public services and

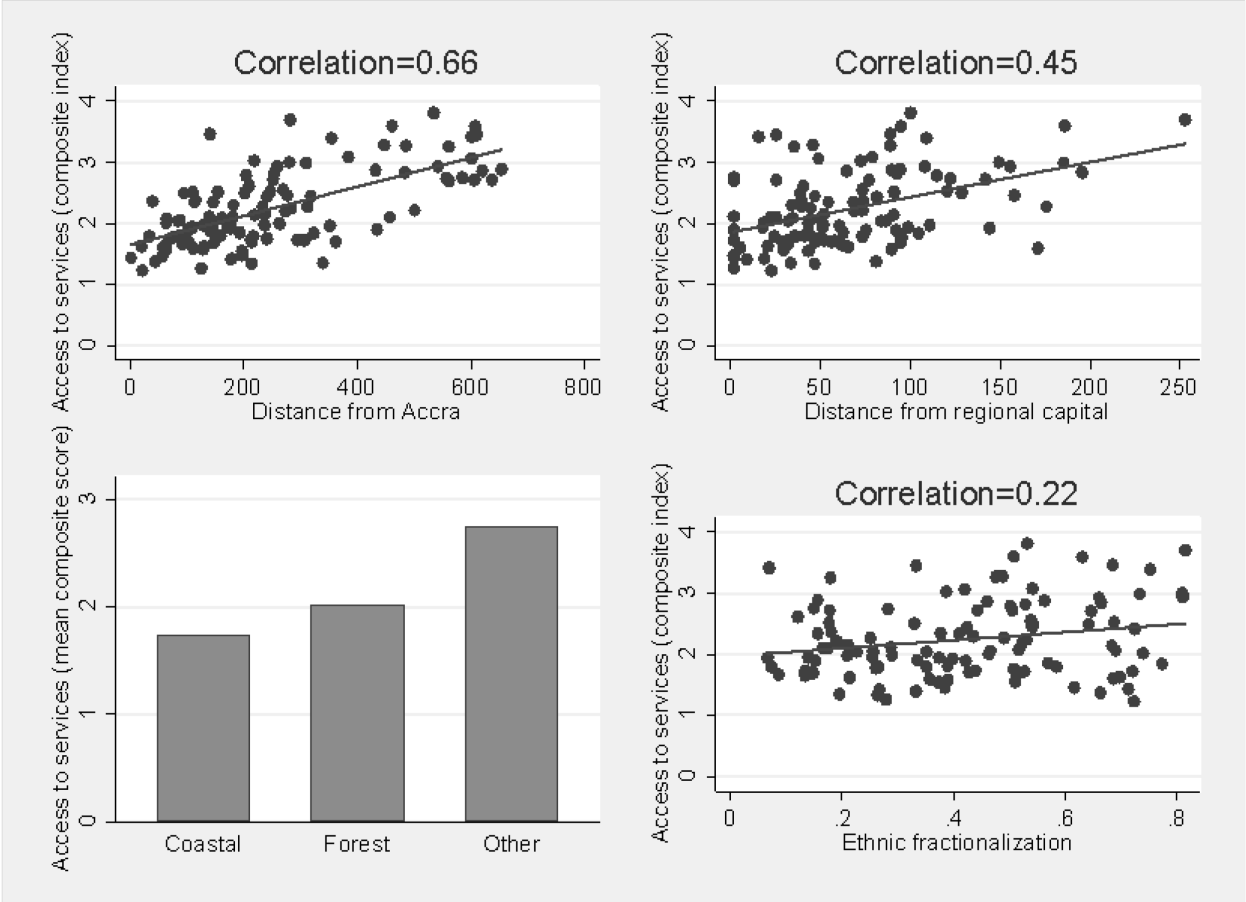
[10] These agro-ecological zones can further be divided into smaller zones. For example, the forest zone is divided to rain and deciduous forest zones.

[10] District—level poverty is obtained from Coulombe (2005).

poverty rate, although we observe no significant correlation between access to local public services and per capita public expenditures (both total and capital). However, since correlation measures only a linear relationship, having correlation close or equal to zero does not mean that there is no relationship between these variables.

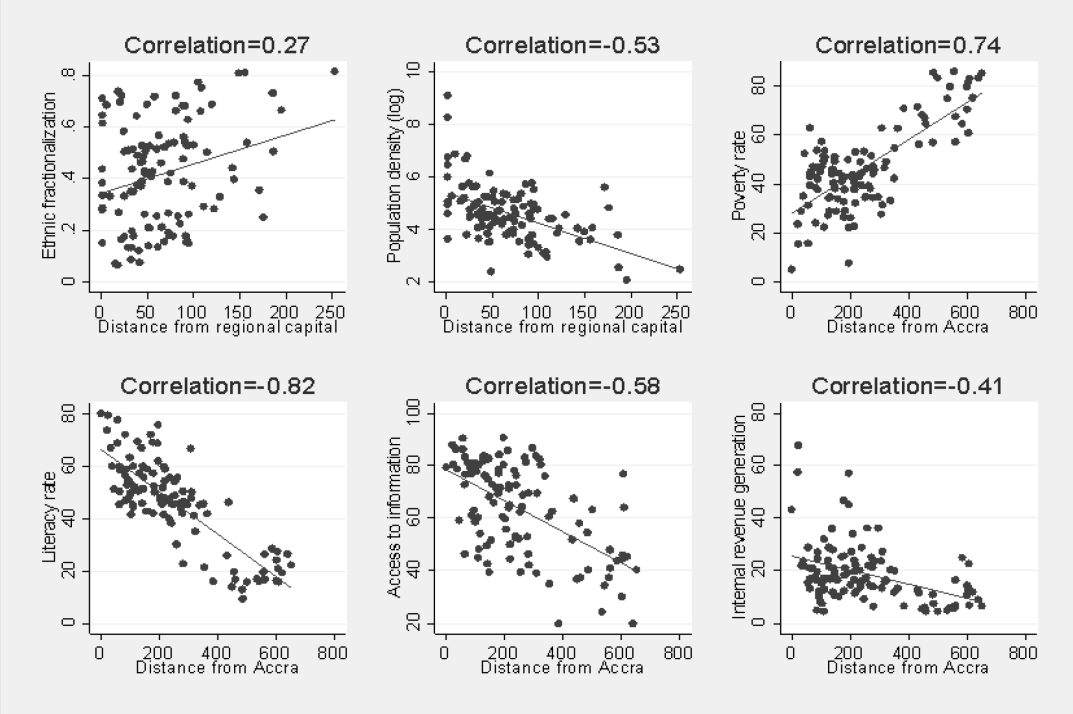
The importance of a district's geography suggests that there could be departures from randomness and spatial clustering in the data, that is, systematic pattern in spatial distribution of access to services and its potential determinants. Figure 4 shows the spatial patterns of access to local public services and some of its potential determinants. Districts showing better access to local public services tend to be clustered in the south (coastal and forest zones), while districts with lower access to public services tend to be clustered in the north (savannah zone), with some exceptions. Similarly, districts in the north are more likely to be poor and have low literacy levels and poor access to information.

Figure 2. Partial associations between the dependent variable (access to local public services) and the key independent variables (geography and ethnic diversity)



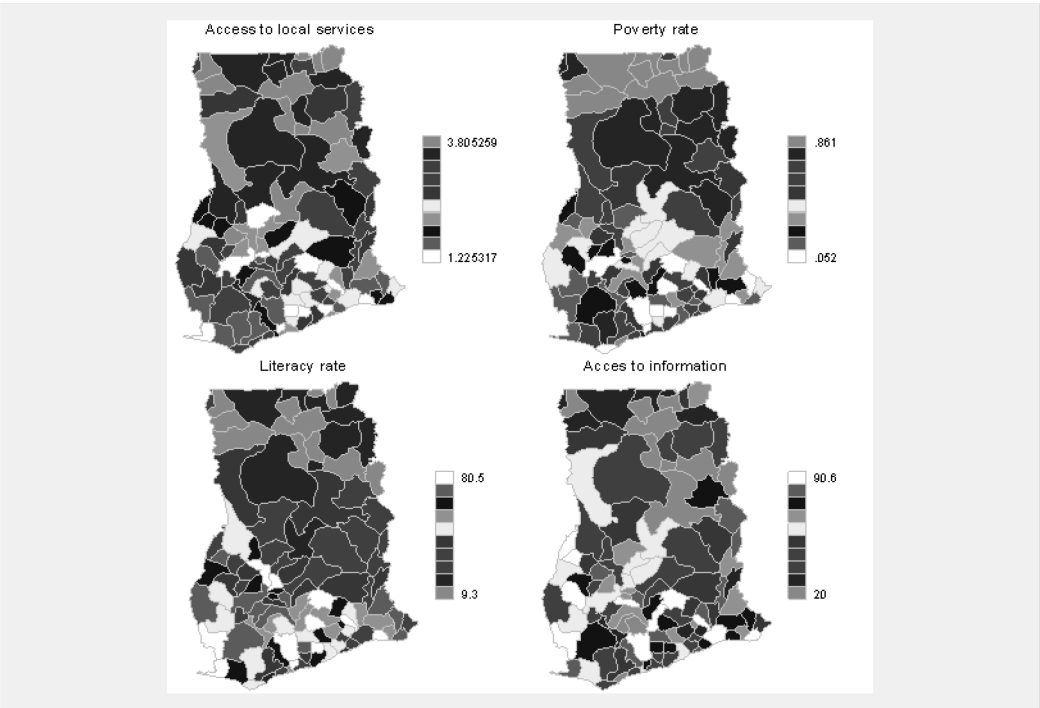
Source: GSS (2003 & 2005) and authors' own estimates

Figure 3. Partial associations between geography, ethnic diversity, and proximate determinants of access to local public services



Source: GSS (2003 & 2005) and authors' own estimates

Figure 4. Spatial patterns of access to local public services, poverty, literacy, and access to information



Source: GSS (2003 & 2005) and authors' own estimates

To further examine spatial clustering in variables, we use Moran's I test (Moran 1950), which is a weighted correlation coefficient used to detect departures from spatial randomness. When measures for nearby districts are similar, Moran's I will be significant and positive. Table 1 reports the results of Moran's I test for access to local services and its potential determinants. As can be seen in Table 1, several variables including access to local services, poverty rate, literacy rate, road density, and level of access to information show considerable positive spatial correlations. Some variables such as ethnic fractionalization, internal revenue generation, and share of rural population have positive but small spatial correlations. Other variables, including district population density and per capita public expenditures, do not show any statistically significant spatial patterns measured by Moran's I. With respect to district public expenditures, this could be a result of the national government's fiscal equalization policy.

The results of descriptive analysis seem to agree with predictions of the theoretical model. However, these relationships are much more complicated, and we need to use multivariate econometric analysis, rather than simple correlations, to better understand them. The results of such analyses are provided in the following section.

Table 1. Moran's I test for spatial dependence

	Moran's I*	**Z-value**	**p-value****
Access to local services	0.44	12.265	0.000
Poverty	0.61	16.841	0.000
Literacy	0.67	18.348	0.000
Road density	0.40	11.241	0.000
Information access			
Newspaper	0.25	7.011	0.000
Radio	0.37	10.289	0.000
Ethnic fractionalization	0.19	5.495	0.000
Internal revenue generation	0.13	3.858	0.000
Share of rural population	0.13	3.863	0.000
Population density	0.007	0.780	0.218
Per capita public expenditures	0.025	0.927	0.177

Source: Authors' own estimates

Note: * Distance band (0–1); **Probability to reject null hypothesis (absence of spatial dependence)

5. REGRESSION RESULTS

5.1. District-Level Analysis

Table 2 shows the results of district-level econometric analysis. We used a composite index of access to local public services, which is a combined measure of access to seven specific local services, as a dependent variable. Models 1–4 are OLS estimates of equation (10). Model 5 is the first-degree spatial error regression estimate of equation (11).

As can be seen in Table 2, where only geographic variables are included in the model, all of them prove to be statistically significant. In particular, the districts that are father away from Accra as well as from a regional capital tend to have lower access to local public services. Similarly, the districts located in coastal and forest zones are likely to have better access to local public services. When we add the ethnic fractionalization, which is likely to encompass the heterogeneity of preferences for public services and social capital, geographic variables (except the coastal dummy) remain significant, but their negative impact diminishes considerably. This effect can be seen as demonstrating the importance of ethnic diversity for local public services. Further, when we add additional proximate variables (which are correlated with geography) into the model, the importance of geographic variables continues to diminish while the importance of ethnic fractionalization continues to increase.

The full specification of the model (Model 4) explains more than three-fourths of the cross-district variation in access to local public services in Ghana. The results suggest that ethnic fractionalization is the most important determinant of access to public services. Geography remains important. Districts that are located in coastal and forest zones are likely to have better access to local public services. Although distance from the regional capital is statistically significant, its practical importance (magnitude of estimated coefficients) is very limited. Distance from Accra is both statistically and practically insignificant. Among proximate determinants of access to local public services, those statistically significant at an acceptable level are share of rural population, literacy, internal fiscal capacity and access to information. All of these variables, excluding internal fiscal capacity, have expected signs.

It is important to note that with addition of all measures of deep and proximate determinants of access, local public service at hand, the spatial dependence (autocorrelation) of residuals reduced significantly. Nevertheless, Model 5 in Table 2 displays the results implemented by considering possible spatial dependence between observations. The coefficients of the spatial error term appear sizable in magnitude and statistically significant. According to this model, ethnic fractionalization is even more important in determining the access to local public services. The coefficient associated with this variable increased to 0.79 from 0.54. The coefficients associated with the coastal dummy and internal fiscal capacity are no longer statistically significant at acceptable significance levels. In contrast, the coefficient associated with per capita district public expenditures turns out to be statistically significant. The positive sign of the coefficient suggests that the higher the per capita district public expenditures, the lower the access to local public services. How can we explain this result? One possible explanation could be the central government's equalization policy. Further, we would like to emphasize the results associated with literacy rate. As mentioned above, we are not trying to isolate the effect of literacy skills on access to local public services but rather to test the use of literacy as a proxy for human capital and managerial capacity in the district. The estimated coefficients suggest that the higher the literacy level, the higher the access to local public services. Finally, the coefficient for population density (Model 5 in Table 2) indicates that the district size matters for local public service delivery. This suggests that there are economies of scale, that is, the cost advantages due to population size, in local public service provision across Ghana's districts, which is in line with the predictions of the theoretical model.

Table 2. Determinants of access to local services (district-level data)

	Model 1	Model 2	Model 3	Model 4	Model 5
Distance from Accra	0.0015*	0.0014*	0.0010*	0.0005	0.0003
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0004)
Distance from region's capital	0.0041*	0.0024*	0.0022*	0.0018**	0.0016**
	(0.0003)	(0.0007)	(0.0007)	(0.0007)	(0.0008)
Forest	-0.3919*	-0.2718*	-0.2454*	-0.2291*	-0.2638*
	(0.1034)	(0.0876)	(0.0861)	(0.0837)	(0.0844)
Coastal	-0.4701*	-0.1485	-0.1641	-0.2318**	-0.2086
	(0.1146)	(0.1057)	(0.1074)	(0.0976)	(0.1377)
Ethnic fractionalization		0.5840*	0.5984*	0.5436*	0.7926*
		(0.1730)	(0.1657)	(0.1683)	(0.1980)
Share of rural population		0.0112*	0.0106*	0.0113*	0.0132*
		(0.0016)	(0.0022)	(0.0024)	(0.0021)
Literacy			-0.0064***	-0.0095**	-0.0115**
			(0.0038)	(0.0038)	(0.0048)
Population density (log)			0.0268	0.0220	0.0969***
			(0.0598)	(0.0617)	(0.0510)
Per captia district expenditures (log)				0.1561***	0.1364*
				(0.0832)	(0.0508)
Internal revenue generation				0.0098**	0.0074
				(0.0048)	(0.0046)
Access to information (radio)				-0.0065**	-0.0066**
				(0.0030)	(0.0027)
Lambda					-0.2882*
					(0.0678)
Constant	1.8588	0.8468	1.1566	0.1959	0.1443
	(0.1341)	(0.1694)	(0.4540)	(0.8846)	(0.2594)
Adj. R-squared	0.621	0.7301	0.7358	0.7661	0.7550
F-statistics	45.45	44.75	34.81	31.32	-
N	110	110	110	110	110

Note: Models 1–4 are the OLS estimates with robust standard errors in parentheses. Model 5 is the estimates of the spatial error regression model by maximum likelihood: log-likelihood=-14.2; variance ratio=0.762; Wald test of lambda=0: $Chi^2(1)=18.083$ (P value=0.000); LR test of lambda=0: $Chi^2(1)=18.786$ (P value=0.000).

*p < 0.01; **p < 0.05; ***p<0.1.

5.2. Household-Level Analysis

To further examine the effects of geography, ethnic fractionalization, population density, and other district- and household-level characteristics on access to local public services, we use household-level data from the 2003 CWIQ survey. At this stage of analysis, we estimate series of multilevel random-intercept logit models of access to drinking water based on equations (12) and (13). Our two binary dependent variables measure whether a household has access to a drinking water: (1) access to drinking water and (2) access to improved drinking water. Maximum likelihood estimates of a two- and three-level random-intercept logit models were obtained using generalized linear latent and mixed models (GLLAMM) framework, which uses adaptive quadrature (Rabe-Hesketh and Skrondal 2004 and 2005). The goodness of fit of the estimated models is measured by using likelihood ratio test, deviance, and

information criteria (AIC and BIC), which indicate that three-level random-intercept models are superior in describing the evidence of access to drinking water in Ghana.

Table 3 reports coefficients estimated for determinants of access to any source of drinking water. Model 1 in Table 3 reports results for a model that includes only household and community characteristics. These results suggest that households whose head is literate are more likely to have access to drinking water. In the same way, households that reside in communities with all-season access to roads are likely to have better access to drinking water. In contrast, rural and poorer households are likely to have significantly lower access to drinking water. Surprisingly, ceteris paribus, households with a male head are less likely to have access to drinking water. On the other hand, analogous to district-level analysis, when only geographic variables are included in the model (not reported here), the negative impact of distance from Accra and regional capitals proves to be statistically significant in explaining household-level access to drinking water. Similarly, ethnic fractionalization has significant negative impact on access to drinking water.

It is interesting to see whether household, community and district characteristics counterbalance the adverse effects of geography and ethnic diversity. Model 2 in Table 3 reports the results of logistic regression, which includes household, community, and district characteristics. The next two columns in Table 3 provide the results of two- and three-level random-intercept models, respectively. The coefficients across models tell qualitatively similar stories, with some minor exceptions, about the impact of explanatory variables on the probability of household-level access to drinking water. As we mentioned above, the three-level random-intercept model (Model 4) better fits the data. Thus, the following discussion is based on results of this model. The results show that the negative impact of distance from Accra and regional capitals virtually disappears. In fact, coefficients for these variables are practically very small. However, the impact of agro-ecology persists or even gets stronger, suggesting that households that reside in forest and coastal zones are significantly more likely to have better access to drinking water as compared with households from other zones. Likewise, the negative impact of ethnic fractionalization continues to be both statistically and practically significant. Finally, as the theoretical model predicts, the district size, measured by population density, influences the household-level access to drinking water significantly. The coefficient for population density suggests that a one-unit (percent) increase in district population density increases the likelihood (odds ratio) of access to drinking water at the household level by about 1.4 times. The results also suggest that, other things being equal, households that reside in districts with higher levels of human capital (literacy level) and access to information are more likely to have better access to drinking water. The impact of the per capita district public expenditures on access to any sources of water appears to be statistically insignificant. Comparing the results of Model 1 and Model 4, we can see that return to private (education and income) assets in terms of access to drinking water diminishes considerably when observable district characteristics (geography, ethnic diversity, population density, human capital, public expenditures, etc.) are included in the model, and unobserved heterogeneity at district and region levels is controlled for. However, return to public assets (access to roads) in terms of access to drinking water is robust to changes in model specification.

It is more interesting to examine the results of the model for access to improved drinking water. These results, which are provided in Table 4, are both qualitatively and quantitatively different in many ways from the results in Table 3. First, positive household (education and income) and community characteristics (access to roads) seem to counterbalance the effects of adverse geography to greater extent. In fact, coefficients estimated for a three-level random-intercept logit model (our preferred specification) suggest that the impact of distance variables from major cities is virtually insignificant in determining household-level access to improved drinking water. Similarly, the impact of coastal agro-ecological zone is statistically insignificant. However, the results suggest that households that reside in a forest zone have significantly higher chances to have access to improved drinking water. At the same time, estimated coefficients for income quintiles, household head's literacy, and access to all-season roads are both quantitatively and qualitatively robust to changes in model specification. Also, rural households seem to have greater disadvantage than their urban counterparts. Second, the negative impact of ethnic fractionalization turns out, however, to be extremely significant. In fact, the magnitude of the estimated

coefficient (Model 4 in Table 4) is about four times as much as compared with the model for access to drinking water (Model 4 in Table 3). This coefficient is equal to -1.3133 and quite precisely estimated with a standard error of 0.0881. Third, differently from our previous model (Table 3), the results suggest that per capita district public expenditures have positive impact on access to improved drinking water. The magnitude and sign of the estimated coefficients are robust to changes in model specification. Finally, the results for district characteristics such as population density and average literacy level are qualitatively similar for both models. However, the magnitudes of the coefficients for the model of access to improved drinking water are significantly higher.

Table 3. Determinants of access to drinking water (household level)
Dependent variable: Binary variable indicating whether a household has access to any drinking water source

	Model 1	**Model 2**	**Model 3**	**Model 4**
Household characteristics				
If head of household is male	-0.4136*	-0.2181*	-0.1962*	-0.1922*
	(0.0309)	(0.0322)	(0.0330)	(0.0331)
If head of household is literate	0.5389*	0.2992*	0.2943*	0.2904*
	(0.0280)	(0.0298)	(0.0305)	(0.0305)
Rural	-0.6911*	-0.5770*	-0.6314*	-0.6227*
	(0.0324)	(0.0366)	(0.0377)	(0.0375)
Income quintile 1	-0.6720*	-0.1762*	-0.1472*	-0.1469*
	(0.0380)	(0.0418)	(0.0430)	(0.0428)
Income quintile 2	-0.4094*	-0.1782*	-0.1262*	-0.1097*
	(0.0389)	(0.0404)	(0.0417)	(0.0417)
Income quintile 3	-0.2108*	-0.1104**	-0.0824**	-0.0670
	(0.0412)	(0.0422)	(0.0433)	(0.0434)
Income quintile 4	-0.1245*	-0.0865**	-0.0693	-0.0542
	(0.0409)	(0.0417)	(0.0427)	(0.0428)
Community characteristics				
Access to roads	0.4279*	0.3447*	0.3503*	0.3741*
	(0.0259)	(0.0268)	(0.0285)	(0.0284)
District characteristics				
Distance to Accra		**0.0008***	**0.0022***	**0.0021***
		(0.0001)	(0.0002)	(0.0002)
Distance to regional capital		**0.0022****	**0.0025***	**0.0023***
		(0.0003)	(0.0004)	(0.0004)
Forest		**0.6731***	**0.7904***	**0.8671***
		(0.0364)	(0.0438)	(0.0549)
Coastal		**0.5437***	**0.6298***	**0.7274***
		(0.0541)	(0.0629)	(0.0666)
Ethnic fractionalization		**-0.2391***	**-0.8720***	**-0.3433***
		(0.0761)	(0.0852)	(0.0989)
Population density (log)		0.2347*	0.3281*	0.2223*
		0.0218	(0.0295)	(0.0276)
Share of rural population		0.0056	0.0075*	-0.0041*
		(0.0010)	(0.0013)	(0.0016)

Table 3. Continued

	Model 1	Model 2	Model 3	Model 4
Literacy level		**0.0079***	**0.0069***	**0.0084***
		(0.0017)	(0.0019)	(0.0021)
Per capita total expenditures (log)		-0.0269	-0.0061	0.0597
		(0.0301)	(0.0324)	(0.0339)
Access to information (radio)		0.0128*	0.0132*	0.0143*
		(0.0009)	(0.0013)	(0.0011)
Constant	2.1726	-1.0747	-2.3380	-2.1925
	(0.0463)	(0.3577)	(0.4017)	(0.4383)
Variances and covariances of random effects				
District			0.2194*	0.2247*
			(0.0118)	(0.0137)
Region				0.0868*
				(0.0187)
Pseudo R-squared	0.0749	0.1102	0.1464	0.1471
Log likelihood	-20922.4	-20124.5	-19306.9	-19290.8

Note: Models 1 and 2 are standard logistic regression models, and Models 3 and 4 are two- and three-level random-intercept models, respectively. The number of level-1 observations is 49,000, with 110 level-2 units (districts) and 10 level-3 units (regions). Logits for income quintiles are calculated with reference to quintile 5.

*p < 0.01; **p < 0.05; ***p<0.1.

Table 4. Determinants of access to improved drinking water (household level)

Dependent variable: Binary variable indicating whether a household has access to improved drinking water

	Model 1	Model 2	Model 3	Model 4
Household characteristics				
If head of household is male	-0.3367*	-0.3311*	-0.3289*	-0.3150*
	(0.0259)	(0.0274)	(0.0289)	(0.0290)
If head of household is literate	0.3162*	0.3288*	0.3633*	0.3612*
	(0.0235)	(0.0252)	(0.0265)	(0.0265)
Rural	-1.1122*	-0.8778*	-0.9031*	-0.9032*
	(0.0273)	(0.0309)	(0.0327)	(0.0321)
Income quintile 1	-0.3110*	-0.3197*	-0.3857*	-0.3781*
	(0.0332)	(0.0369)	(0.0394)	(0.0394)
Income quintile 2	-0.3536*	-0.3073*	-0.3306*	-0.3301*
	(0.0327)	(0.0343)	(0.0363)	(0.0363)
Income quintile 3	-0.2261*	-0.1985*	-0.2149*	-0.2119*
	(0.0339)	(0.0352)	(0.0372)	(0.0371)
Income quintile 4	-0.1304*	-0.1305*	-0.1475*	-0.1405*
	(0.0334)	(0.0346)	(0.0365)	(0.0365)
Community characteristics				
Access to roads	0.5738*	0.5198*	0.6446*	0.6356*
	(0.0222)	(0.0234)	(0.0253)	(0.0250)
District characteristics				
Distance to Accra		**0.0033***	**0.0041***	**0.0043***
		(0.0001)	(0.0002)	(0.0002)
Distance to regional capital		**-0.0014***	**-0.0015***	**-0.0032***
		(0.0003)	(0.0003)	(0.0003)

Table 4. Continued

	Model 1	Model 2	Model 3	Model 4
Forest		**0.5088***	**0.5929***	**0.7188***
		(0.0312)	(0.0399)	(0.0396)
Coastal		-0.1173*	-0.1225*	-0.0578
		(0.0451)	(0.0491)	(0.0489)
Ethnic fractionalization		**-0.5795***	**-0.8580***	**-1.3133***
		(0.0632)	(0.0766)	(0.0881)
Population density (log)		0.4060*	0.4480*	0.3641*
		(0.0202)	(0.0254)	(0.0273)
Share of rural population		0.0008	0.0047*	0.0028*
		(0.0009)	(0.0011)	(0.0012)
Literacy level		0.0011	0.0016	0.0111*
		(0.0014)	(0.0017)	(0.0018)
Per capita total expenditures (log)		0.3686*	0.4098*	0.2964*
		(0.0265)	(0.0319)	(0.0330)
Access to information (radio)		0.0094*	0.0174*	0.0099*
		(0.0008)	(0.0010)	(0.0012)
Constant	1.6926	-5.2242	-6.8641	-5.0792
	(0.0387)	(0.3193)	(0.3704)	(0.4034)
Variances and covariances of random effects				
District			0.3057*	0.3475*
			(0.0129)	(0.0168)
Region				0.2597*
				(0.0264)
Pseudo R-squared	0.0907	0.1433	0.2118	0.2126
Log likelihood	-26292.6	-24771.0	-22792.5	-22767.9

Note: Models 1 and 2 are standard logistic regression models, and Models 3 and 4 are two- and three-level random-intercept models, respectively. The number of level-1 observations is 48,921, with 110 level-2 units (districts) and 10 level-3 units (regions). Logits of income quintiles are calculated with reference to quintile 5.
*p < 0.01; **p < 0.05; ***p<0.1.

5.3. Interactions

In this section, we address two important questions. First, does the investment in human capital mitigate the negative impact of ethnic diversity on local public services? If so, then the negative impact of ethnic diversity on access to local public services should be lower in districts with higher literacy. Second, is the negative impact of ethnic diversity on local public services equal for urban and rural households? Table 5 reports estimates of the interaction effects of ethnic diversity with literacy and rural households. The marginal effect of ethnic fractionalization, in these models, depends on the values of the literacy and rural variables, respectively, involved in the interactions. In particular, the marginal impact of a one-unit change in ethnic diversity on access to water depends on the level of average literacy in the district or whether a household is urban or rural.

One of our key findings is that the negative impact of ethnic fractionalization diminishes as average literacy level increases. The marginal impact of ethnic fractionalization on drinking water and improved drinking water is equal to

-0.5345(EFI) + 0.0109*(EFI*Literacy level), and*

-1.4020(EFI) + 0.0068*(EFI*Literacy level),*

respectively. The sizes and signs of the coefficients for the main and interaction terms illustrate how the relative impact of ethnic fractionalization varies by literacy level.

The second important finding is that net impact of ethnic fractionalization is different for urban and rural households. In fact, for urban households (where rural dummy is zero), the marginal impact of

ethnic fractionalization is either virtually zero (improved drinking water) or positive (any source of drinking water). In contrast, for rural households (where rural dummy is 1), the marginal impact of ethnic fractionalization is significantly negative. The magnitudes of the coefficients for the main and interaction effects suggest that differences in the marginal impact of ethnic fractionalization between urban and rural areas are even greater in the case of improved drinking water.

It is worth it to note that the introduction of interaction terms in model specifications did not result in significant changes in the estimated coefficients of other variables compared with our earlier estimations. This provides additional evidence of the robustness of the results.

Table 5. Determinants of access to drinking water (household level, interactions)

	Drinking water		**Improved drinking water**	
	Model 1	**Model 2**	**Model 3**	**Model 4**
Household characteristics				
If head of household is male	-0.1951*	-0.2008*	-0.3298*	-0.3154*
	(0.0333)	(0.0333)	(0.0288)	(0.0288)
If head of household is literate	0.2949*	0.3076*	0.3760*	0.3697*
	(0.0305)	(0.0305)	(0.0264)	(0.0265)
Rural	-0.6364*		-0.8897*	
	(0.0378)		(0.0318)	
Income quintile 1	-0.1222*	-0.1438*	-0.3807*	-0.3492*
	(0.0444)	(0.0433)	(0.0389)	(0.0394)
Income quintile 2	-0.1038**	-0.1074**	-0.3162*	-0.3004*
	(0.0424)	(0.0419)	(0.0360)	(0.0363)
Income quintile 3	-0.0639	-0.0629	-0.2042*	-0.1960*
	(0.0436)	(0.0434)	(0.0370)	(0.0371)
Income quintile 4	-0.0509	-0.0478	-0.1364*	-0.1319*
	(0.0428)	(0.0427)	(0.0364)	(0.0365)
Community characteristics				
Access to roads	0.3571*	0.3925*	0.6522*	0.6722*
	(0.0284)	(0.0296)	(0.0253)	(0.0294)
District characteristics				
Distance to Accra	0.0019*	0.0019*	0.0041*	0.0057*
	(0.0002)	(0.0002)	(0.0001)	(0.0002)
Distance to regional capital	0.0010	0.0026*	-0.0017*	-0.0019*
	(0.0006)	(0.0004)	(0.0003)	(0.0003)
Forest	0.7791*	0.9031*	0.5139*	0.4382*
	(0.0824)	(0.0539)	(0.0320)	(0.0339)
Coastal	0.5454*	0.6889*	-0.1275*	-0.1961*
	(0.0616)	(0.0675)	(0.0502)	(0.0488)
Ethnic fractionalization	**-0.5345***	**0.5101***	**-1.4020***	**-0.0224**
	(0.1374)	(0.1231)	(0.1555)	(0.0925)
Ethnic fractionalization*literacy	**0.0109***		**0.0068***	
	(0.0031)		(0.0029)	
Ethnic fractionalization*rural		**-1.1271***		**-1.8350***
		(0.0769)		(0.0653)
Population density (log)	0.1475*	0.1805*	0.3882*	0.3427
	(0.0278)	(0.0293)	(0.0249)	(0.0290)
Share of rural population	-0.0035**	-0.0019	0.0052*	-0.0038*
	(0.0016)	(0.0017)	(0.0010)	(0.0012)

Table 5. Continued.

	Drinking water		Improved drinking water	
	Model 1	**Model 2**	**Model 3**	**Model 4**
Literacy level		0.0091*		0.0093*
		(0.0020)		(0.0017)
Per capita total expenditures (log)	-0.0720**	0.00346	0.2577*	0.6309*
	(0.0341)	(0.0352)	(0.0299)	(0.0310)
Access to information (radio)	0.0093*	0.0128	0.0194*	0.0035*
	(0.0012)	(0.0011)	(0.0009)	(0.0010)
Constant	0.7061	-1.6960	-5.1419	-8.3167*
	(0.4070)	(0.4707)	(0.3530)	(0.3763)
Variances and covariances of random effects				
District	0.2269*	0.2240*	0.3376*	0.2892*
	(0.0146)	(0.0135)	(0.0128)	(0.0110)
Region	0.0720*	0.0373*	0.3644*	0.1345*
	(0.0219)	(0.0124)	(0.0386)	(0.0122)
Pseudo R-squared	0.1468	0.1456	0.2123	0.2123
Log likelihood	-19297.5	-19323.2	-22776.4	-22776.8

Note: All models are three-level random-intercept logistic regressions. Logits of income quintiles are calculated with reference to quintile 5. *p < 0.01; **p < 0.05.

6. CONCLUSIONS

In this paper we develop a simple framework that explains disparities in local public services between decentralized districts within a country. Our framework suggests that fundamental differences in geography and ethnic composition of population have important effects in local public service provision. We hypothesize that these effects are either direct or via other basic socioeconomic variables, such as income, population density, local institutions, and so forth.

Then, we use this framework to examine observed differences in local public services between Ghana's decentralized districts. We find that geography and ethnic diversity are important determinants of access to local public services. We also find that access to private and community-level public assets can diminish the effects of adverse geography. Our findings also suggest that district characteristics, such as literacy level, share of rural population, access to information, and district public expenditures, have a marginal effect on access to local public services. These results are robust to changes in model specification and across levels of analysis.

In econometric as well as policy terms, the most interesting feature of the results is that no variable other than ethnic fractionalization is consistently, both in statistical and practical terms, significant across the levels and types of analysis. Relationships of ethnic fractionalization are robust and insensitive to changes in empirical specifications. Overall, the higher the ethnic fractionalization, the lower the level of access to local public services, including drinking water. The negative impact of ethnic fractionalization is especially severe in rural areas.

Our results highlight difficulties in local public service provision in ethnically diverse jurisdictions and are consistent with evidence elsewhere (Alesina et al. 1999; Vigdor 2004; Miguel 2004; Miguel and Gugerty 2005) that examines the impact of ethnic diversity on local public services. The negative relationship between ethnic diversity and local public services can be explained by ethnic differences in tastes and preferences over the types of local public goods, weak social capital, and local institutions that manage interethnic relations. As Miguel and Gugerty (2005) underlines, probably a more promising approach for addressing adverse effects of ethnic diversity is advancing policies that promote successful cooperation across ethnic groups. The results of this paper point out the important role that education (literacy) may play in this regard.

The data presented in this paper are from one of the most decentralized countries in sub-Saharan Africa and took some time to collect and organize. Its quality is sufficient to obtain relevant results. This process demonstrated that data, especially at the district level, regarding local economic development and public services are very scarce in Ghana. The government of Ghana and development partners should pay more attention to collecting and distributing appropriate data consistently and in a timely manner. Without such data, it will be very difficult to make coherent and efficient policies at the national as well as district level.

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APPENDIX

Table A.1. Descriptive statistics of variables

Variable	*N*	*Min*	*Max*	*Mean*	*SD*
District level					
Access to services	110	1.2253	3.8053	2.2410	0.6226
Distance from Accra	110	1.84	652.4	250.1	171.9
Distance from regional capital	110	1.82	252.9	67.4	48.5
Agro-ecological zone					
Forest	110	0	1	0.45	0.50
Coastal	110	0	1	0.17	0.38
Ethnic fractionalization	110	0.0666	0.8146	0.4199	0.2029
Share of rural population	110	0	100	70.1	21.6
Population density (log)	110	2.1	9.1	4.6	1.1
Literacy rate	110	9.3	80.5	46.2	17.0
Headcount ratio	110	5.2	86.1	46.9	17.5
Poverty gap	110	1.2	47.0	18.4	10.4
Per capita total expenditures (log)	110	8.27	10.31	9.51	0.37
Per capita capital expenditures (log)	110	7.55	10.16	9.10	0.43
Internal revenue generation	110	4.4	67.6	18.9	11.3
Access to information					
Radio	110	20.1	90.6	63.7	17.5
Newspaper	110	1.3	52.4	17.9	11.1
Household level					
Access to water	49,003	0	1	0.8264	0.3788
Access to improved water	48,923	0	1	0.7220	0.4480
Gender	49,000	0	1	0.7072	0.4551
Household head's literacy	49,004	0	1	0.4671	0.4989
Rural household	49,003	0	1	0.6269	0.4836
Income quintile 1	49,003	0	1	0.1718	0.3772
Income quintile 2	49,003	0	1	0.1708	0.1763
Income quintile 3	49,003	0	1	0.1700	0.3756
Income quintile 4	49,003	0	1	0.1936	0.3951
Income quintile 5	49,003	0	1	0.2937	0.4554
Access to road	49,003	0	1	0.6408	0.4798

Table A.2. Main characteristics of agro-ecological zones

	Area (km^2)	**Mean annual rainfall (mm)**	**Rainfall pattern**	**Major rainy season**	**Major crops grown**
Forest	83,900	1,600	Bimodal	March–July	Tree crops (cocoa, citrus, oil-palm)
Coastal	4,500	800	Bimodal	March–July	Cereals, starchy crops, and tree crops
Other (savanna)	150,100	1,000	Unimodal	May–September	Cereals, legumes, vegetables

Construction of the Access to Local Public Services Index

The quantitative measurement of district-level access to local public services that we construct is a composite access to local public services index comprised of accessibility of households to service facilities. Data is obtained from the Core Welfare Indicators Questionnaire (CWIQ) survey on standardized welfare indicators. The survey comprised over 49,000 households representative at the district level, including 30,719 rural and 18,284 urban households. All 110 districts of Ghana that existed in 2003 were sampled.

The survey asked households the following question: How long in minutes does it take from here to reach the nearest service facility? The five possible choices were as follows: 0–14 minutes, score 1;

15–29 minutes, score 2; 30–44 minutes, score 3; 45–59 minutes, score 4; 60 minutes or more, score 5. Thus, the higher the score, the longer the time to reach nearest service facility. The constructed index combines scores for the following basic social and infrastructure services: (1) supply of drinking water, (2) food market, (3) public transportation, (4) primary school, (5) secondary school, (6) health care facility (clinic or hospital), and (7) telecommunication facility.

We used the Cronbach's alpha to test the measurement properties and internal consistency of the seven individual items proposed for the access to services index. The literature on scale measurement suggests that a Cronbach's alpha of 0.70 to 0.80 is acceptable, and anything above is considered very good (De Vellis, 1991). Table A.3 shows the item-test, item-rest, and average interitem correlations for each of the seven items and the alpha that would exist if each of the seven items was removed individually from the scale. The average interitem correlations are significant for all of the seven items. This specification results in an overall Cronbach's alpha of 0.869, which appears acceptable using the criteria above. Table A.3 also shows that the removal of any of the items would not substantially improve the Cronbach's alpha.

We then conducted principal components analysis to determine whether the set of items assessed a single construct of access to local public services. The result is consistent with that of the Cronbach's alpha. This analysis retained two factor loadings and showed that the set of items provide a one-dimensional measure of access to local public services. These two factor loadings explain more than 70 percent of total variances.

Table A.3. Gronbach's alpha for seven-item access to services standardized scales

Distance to nearest	Item-test correlation	Item-rest correlation	Average interitem correlation	Alpha
Supply of drinking water	0.530	0.371	0.564	0.886
Food market	0.814	0.731	0.465	0.839
Public transportation	0.805	0.719	0.468	0.841
Primary school	0.651	0.519	0.522	0.867
Secondary school	0.795	0.706	0.471	0.843
Health facility	0.827	0.750	0.460	0.836
Telecommunication facility	0.820	0.740	0.463	0.838
Cronbach's alpha				0.869

Ghana's current legal and organizational framework for the decentralization program is provided by the 1993 Local Government Act (Act 462), which replaced the Local Government Law of 1988 (Law 207). The initiative for the program was motivated by a political philosophy of "power to the people" and the broader reform agenda whose principles concern the role and responsibilities of the various levels of government and private sector for economic development (Ayee 2003a, 2003b). The decentralization process in Ghana started with the establishment of 85 districts in 10 regions of the country in 1988. By 1992, the number of districts had increased to 110.[11]

The 1992 Constitution, which marked Ghana's transition to a multiparty democracy, endorsed the 1988 reforms by consolidating the principles of decentralization within the overall context of a liberal democratic constitution. This constitution laid out the principles of the autonomous role of local government and its downward accountability to the populace. A three-tier structure of subnational government was created at the regional, district, and subdistrict levels. This includes 10 regional coordinating councils; district assemblies (DAs); urban, zonal, town, and area councils; and unit committees. However, the DA is the key local government institution. Article 241 of the constitution states that they are "the highest political authority in the district … with deliberative, legislative and executive power." DAs include both elected and appointed members. Seventy percent of DA members are

[11] As a result of further changes in administrative structure of the country, the number of districts increased to 138 in 2004, and to 162 in 2007. However, this study is based on 110 districts due to lack of data for newly created districts.

elected in local government elections that are held every four years. The central government appoints the other 30 percent of DA members and the district chief executive (DCE), who is an ex-officio member of the respective DA. The members of the national parliament from a district are also entitled to participate in the DA with nonvoting capacity.

In general, the DAs hold three to four general meetings each year, during which they act as the district legislature. The main administrative and executive functions of the DAs are undertaken by the respective executive committees, which are responsible for general policy and overall development planning in a given district. They are the principal authority in their respective districts for development activities, including coordinating and integrating other development partners. The districts are responsible for delivery of various public goods and services, including such significant areas as feeder roads, agricultural extension, primary and secondary education, health, water, and sanitation. Part of these public service delivery functions are devolved to district governments, while others are simply deconcentrated to them.

Devolved public services entail full responsibility residing in the hands of district governments, including legislative (adopting bylaws), fiscal (revenue raising and expenditure allocation), and administrative discretionary power. Examples of such devolved services in Ghana include construction and maintenance of feeder roads, delivery of relief and sanitation services, and development planning. Delegated public services include those that are delegated to districts by the central government ministry or agency. In this case, the DAs act as agents of central government without significant discretionary power in these services. Examples of delegated services in Ghana are the provision of public health services in consultation with the Ministry of Health; the delivery of primary and secondary education under guidance of the Ministry of Education; and water supply in conjunction with the Ghana Water and Sewerage Corporation in urban areas and with the Community Water and Sanitation Agency in rural areas.

With respect to fiscal decentralization, districts are entitled to generate their own internal revenues. However, the potential to generate their own internal revenue varies significantly across districts: Some districts cover up to 70 percent of their total public expenditures by internally generated revenues, yet some other, poor districts cover only about 5 percent of their total public expenditures by internally collected funds. The latter districts rely mostly on transfers from the national government. Article 252 of the 1992 Constitution of Ghana mandated the transfer of at least 5 percent of total national fiscal revenues to district governments through the District Assembly Common Fund (DACF), which was implemented in 1994. Starting in 2008, the size of these transfers increased to 7.5 percent of the total national revenues. On average, in 2004, transfers from the central government accounted for over 80 percent of total local revenues. The DACF grants are allocated between districts based on a special formula, which is approved by the national parliament every year. This formula considers various social and economic factors, such as *need*, *responsiveness*, *service pressure*, and *equality*, in allocation of DACF funds between districts (for a detailed discussion of the DACF and the allocation formula, see Banful 2008).

Earlier studies have shown that the development pattern in Ghana is characterized by a north-south divide in which the south outperforms the north (ODI and CEPA 2005; Shepherd and Gyimah-Boadi 2004). These studies claimed that underdevelopment of the north compared with the south is due to history, unfavorable climate and agro-ecological conditions, and postindependence political neglect. One previous study in particular found that overall inequality in Ghana has taken an upward trend since 1992 and become increasingly polarized (Vanderpuye-Orgle 2002). This study argued that much of the variation in total inequality can be attributed to changes in spatial disparities between administrative regions, agro-ecological zones, and the rural-urban divide. However, there are serious gaps in the existing research. As we mentioned earlier, the main administrative unit for decentralization in Ghana is a district. Therefore, any meaningful decentralization policy needs information about levels and trends in interdistrict disparities in economic opportunities and local public service provision.

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